

Plasma Fairings for Quieting Aircraft Landing Gear Noise, Phase I

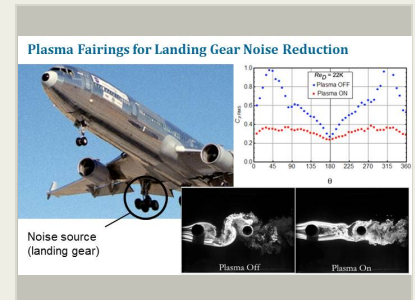
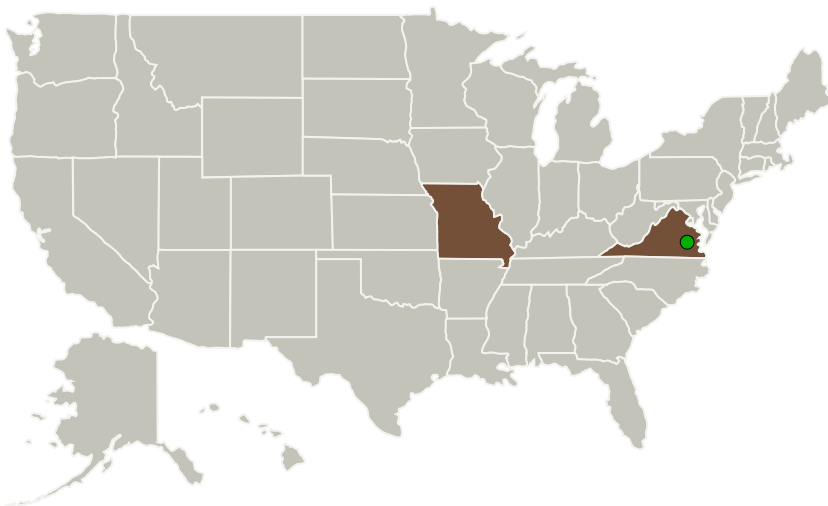
Completed Technology Project (2013 - 2013)



Project Introduction

A major component of airframe noise for commercial transport aircraft is the deployed landing gear. The noise from the gear originates due to complex, unsteady bluff body flow separation from gear components and the subsequent multiple interactions of unsteady wakes with downstream undercarriage elements. The object of this SBIR effort is to develop and advance a novel 'plasma fairing' technology for quieting landing gear noise. The concept deals with the use of single dielectric barrier discharge (SDBD) plasma actuators to reduce noise associated with bluff body separation around the gear. SDBD plasma actuators will be employed either in the form of spanwise-orientated actuators or plasma streamwise vortex generators (PSVGs) to suppress surface pressure fluctuations, and consequently flow-induced noise, on a representative landing gear model. Our Phase I effort will involve a combination of numerical and experimental studies to be conducted at Innovative Technology Applications Company, LLC and the University of Notre Dame, respectively, in order to advance the design and optimization of 'plasma fairings' from a simple geometry (tandem circular cylinder) to a more complex/realistic landing gear geometry (e.g., the Gulfstream G550 nose gear). A combination of DES numerical simulations and wind tunnel experiments is expected to provide a clear demonstration of the plasma fairing performance for noise reduction, while providing a clear path forward for Phase II.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Innovative Technology Applications Co.	Lead Organization	Industry	Chesterfield, Missouri
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations

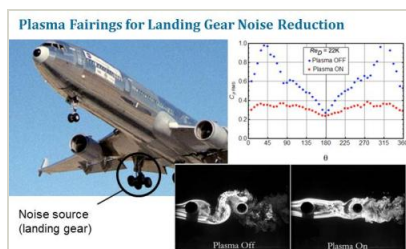
Missouri	Virginia
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Project Transitions

**May 2013:** Project Start**November 2013:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/140363>)

Images

**Project Image**

Plasma Fairings for Quieting Aircraft Landing Gear Noise

(<https://techport.nasa.gov/image/132418>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Innovative Technology Applications Co.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Christopher C Nelson

Co-Investigator:

Chris Nelson

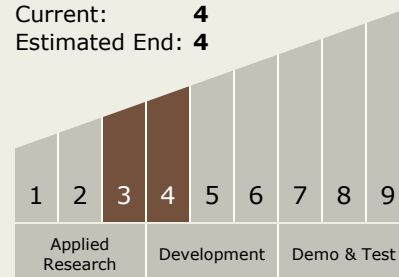
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Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX15 Flight Vehicle Systems
 - └ TX15.1 Aerosciences
 - └ TX15.1.4 Aeroacoustics

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System